

the amount of harm done to those pipes is merely a question of time. Because of the ignorance of legislators and gas and water companies, nothing is said just now; but will nothing be said at the end of ten or twenty years, when pipes are found to be eaten away everywhere? And if by a slight increase of expense, or rather, as I think, actually no increase of expense, but merely a little increase in inventiveness and common sense on the part of electrical engineers, this evil may be entirely prevented, surely it is in the interests of all of us that insulated returns should be insisted upon. But even if we do not insist on insulating the returns in all systems, surely something may be said for the giving of this protection on lines near such a magnetic observatory as Kew. Even the magnetograph records now being made have been continuous for forty-five years, and if Kew is interfered with no sum of money can compensate for the interference; for if the Observatory were removed the future observations would have no link with the past.

An engineer in this room declared that it seemed to him an injustice to hamper the progress of electric tramways "for the sake of making observations that never have given, and never may give, to the world any important results." Now, it is not so much on account of Kew that I object to this sort of observation, as to its general spirit of antagonism to scientific research.

There is no doubt that the answer to the old question, which Gilbert might have asked three hundred years ago, "What is the cause of terrestrial magnetism?" is very jealously hidden from us by Nature. The earth probably contains much iron, but its great internal heat seems to forbid our imagining the iron to be magnetic. The assumption that a negative electric charge on the rotating earth will explain things requires such an enormous charge that this assumption has been discarded. There are annual and diurnal variations of a fairly regular kind; there are storms which have some relation to the Aurora Borealis, to sunspots and to earth currents. There are small sudden changes which seem to occur almost instantaneously all over the earth. Observations of these things may be useless from some points of view, but scientific men have been, and continue to be, willing to give up time and much money for this object. Utilitarians had to be cajoled through superstition to allow observations of the stars to be carried on in ancient times, and we have no such cajolery to offer. We simply say that it has been through this sort of useless-looking method of working that all our progress in science has come.

Engineers descended from men who sneered at Cavendish and Franklin and Volta and Oersted and Ohm and Faraday, are you who utilise the results of the work so sneered at, and pile up fortunes in consequence of it, are you the men to sneer at and ridicule the scientific work of the present day because it seems to you useless?

Tell us a better method of observation; give us better suggestions as to what these magnetic phenomena may mean; but the past record of scientific observation enables us to laugh at you when you say that magnetic observations may never give the world any important results. Was Nature ever so open and yet so closed about a secret as she is about this one of terrestrial magnetism? Was there ever one whose revelation promised so much? How very little we know of electricity and magnetism! Does the mere motion of the earth, taking no account of electric charges at all, cause it to be magnetic? Almost anything is on the cards. Surely I need not appeal to your cupidity, but it is quite possible that our knowledge of this secret may enable us to tap a tremendous store of Nature's energy.

Gentlemen, this is not a trades union, and it is not a society for the furtherance of pure scientific research, but it is a society of professional men who recognise the past services of scientific observers with gratitude and respect, and hope for greater ones in the future. And shall it be said of us that our gratitude is not greater than that of Judas, to whom indeed thirty pieces of silver was doubtless a large sum; that "we have given our hearts away a sordid boon"; and that as to our future hopes we are willing to sell our birthright for a mess of pottage?

#### THE NEW SCIENTIFIC LABORATORIES AT KING'S COLLEGE, LONDON.

ON the afternoon of October 30 the new scientific laboratories at King's College were opened by Lord Lister, in the presence of the Lord Mayor and a large and distinguished gathering of men of science. Lord Lister, after his introduction

by Dr. Robertson, the principal of the college, said the occasion marked an event of great importance in the higher education of the metropolis. The necessity of practical instruction to supplement mere lectures was now fully realised; and it was in order to satisfy this want in every particular that the new laboratories had been added to King's College. In many branches the college had long been well equipped for this purpose; the Wheatstone Museum in particular would bear witness to this; but the dissecting-room, and the accommodation for the practical teaching of physiology had been very defective. But now all this had been remedied; the bacteriological laboratory and the geological department had also received many improvements; and, in short, it might safely be said that King's College was now fully abreast of the age in the opportunities it afforded for practical teaching in all departments.

The Lord Mayor proposed a vote of thanks to Lord Lister; and in seconding, the Hon. W. F. D. Smith, M.P., treasurer of the college, stated that the new buildings, together with their equipment, would, when completed, cost 20,000*l.*, and reminded his audience that only one-fifth of this sum had so far been subscribed.

Lord Lister having declared the laboratories open, they were inspected by those present.

The laboratories are the result of a comprehensive scheme of extension and improvement of the teaching accommodation of the college, resolved upon by the council in the summer of 1899, and now practically completed. The biological, architectural, anatomical and mechanical departments have all benefited to a considerable extent by the new works, especially the departments first mentioned. The whole south wing of the college has been raised by an additional story, which includes the new geological, comparative anatomy and botanical departments, while the second story of the north wing, comprising the physiological and bacteriological departments, has been largely reconstructed, as has also the very fine room on the first floor now allotted to the architectural department. The reconstruction of the anatomical department and medical museum is also approximately complete, but the equipment is at present in progress.

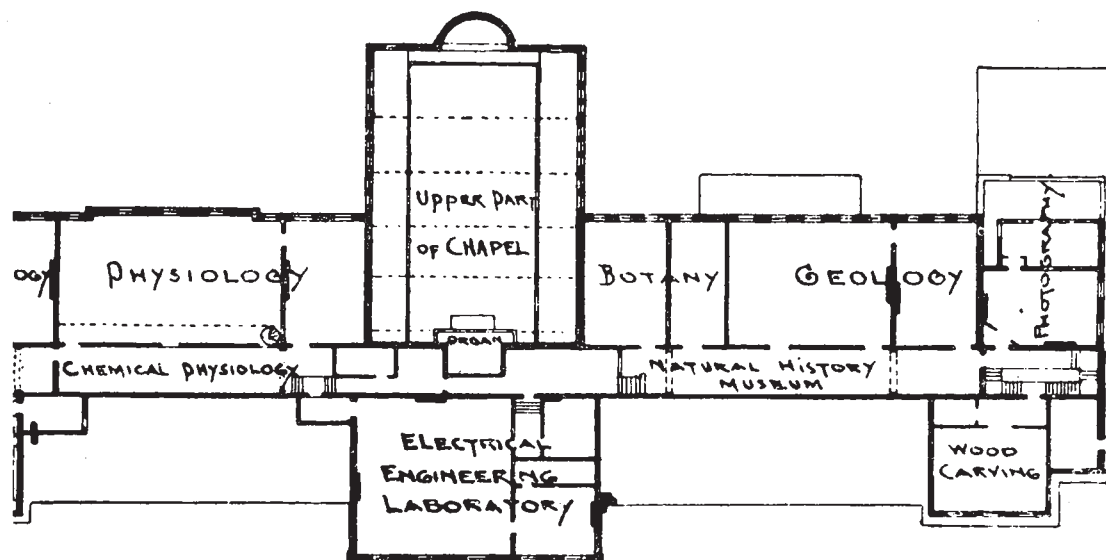
The department of physiology comprises (1) a spacious central laboratory, seating over 100 students; the work tables are suited either for microscope work or for practical work in chemical physiology. There are in addition sixteen separate tables provided with shafting and all the necessary electrical apparatus for the study of experimental physiology, a branch of the science which is becoming every year of greater importance; (2) a large room for investigations in chemical physiology; (3) a spacious and well-fitted room for experimental physiology; (4) a dark room for photographic and galvanometer work; (5) a private workroom for the professor. These, with the necessary storerooms and accommodation for the laboratory attendants, make up a very complete suite of rooms.

In the anatomical department the dissecting room has been nearly doubled in size, and all the accessory rooms necessary in a well-equipped anatomical department are now provided. The section of the college museum which relates to pathology will also be housed in part of the old physiological rooms in the basement, and a new room has been built for the anatomical portion of the museum.

The department of bacteriology contains a practical classroom devoted to the technical education of post-graduate and other students from all parts of the world. Every student with his own hands goes through the whole practical course, and is further assisted by lectures and practical demonstrations. Several students have been especially trained with a view to investigating plague, cholera, yellow fever, madura and other tropical diseases, as well as the diseases of farm stock which are prevalent in our colonies and in foreign countries. In the technical laboratory, research work has been undertaken for the Board of Agriculture and for colonial Governments, while a number of workers have published researches on various bacteriological subjects. The new research room and library is used by advanced students and by the professor. A new feature is the bacteriological library of about 1000 volumes and pamphlets, lent by the professor for the use of the senior students. A lecture theatre has been built for the use of the bacteriological and physiological departments, and will accommodate about 200 students.

The general geological laboratory and lecture room will accommodate fifty students. The room is fitted both for lecturing

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### SECOND FLOOR PLAN

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#### SHEWING NEW LABORATORIES

purposes and practical work, gas, water, and the electric light being laid on. In the practical class the engineering students are divided into several sections; one set of students use the

petrological microscope, another set make blowpipe and chemical examinations of minerals, a third draw sections from geological maps, while a fourth set examine and draw fossils; the work

of each class follows a regular schedule. The geological research laboratory is used by the professor and the more advanced students who wish to do original research. The room is fitted up similarly to the large laboratory, and contains a portion of the teaching collection and the nucleus of a library of geological works and reports.

The botanical laboratories consist of two rooms—the general laboratory for elementary work, and the research laboratory for advanced work and private research. The general laboratory provides table accommodation for twenty-four students, and is equipped with all the necessary appliances for the practical study of plants, either fresh or dry. The botanical research laboratory provides accommodation for twelve students. In this laboratory provision is made for the practical study of the chief physiological processes of plants, and for chemical investigations.

The materia medica and pharmacological collection of specimens used in teaching is contained in the upper part of the corridor, and is open to students for purposes of study; the lectures are given in another part of the building.

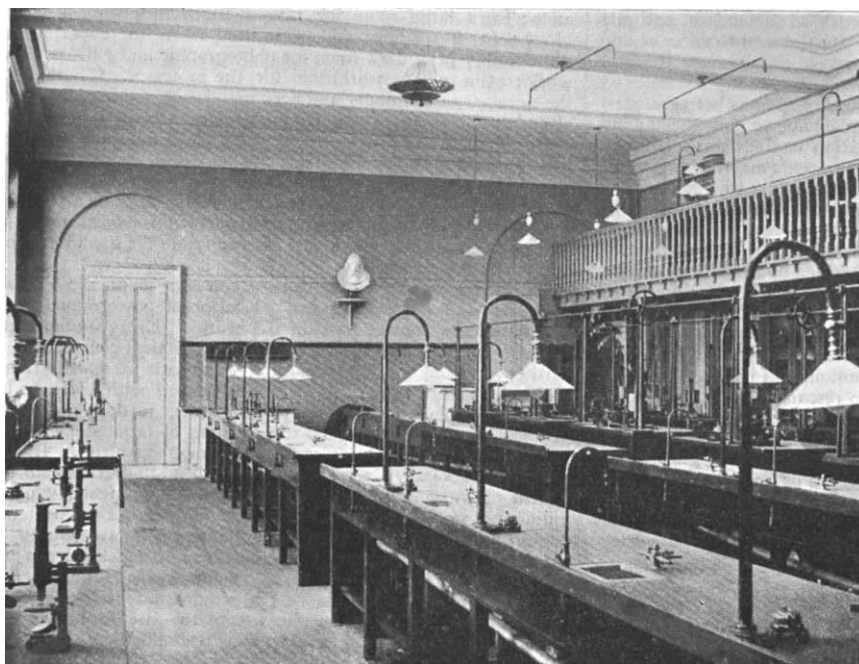


FIG. 2.—The general laboratory and classroom in the Physiological Department.

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The Wheatstone Physical Laboratory is well equipped for delicate balance work, heat and electrical measurement, and the determination of the general physical constants. A new dark room for spectroscopic work has been specially constructed, and a room set apart for magnetic work.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The annual grant to the Botanic Garden has been raised to a sum which will make the income of the garden 670*l.*, instead of 650*l.* as formerly.

The examiners for the Burdett-Coutts Scholarship in geology have not awarded the scholarship this year.

The Board of the Faculty of Natural Science have recommended that certificates should be issued entitling the following to supplicate for the degree of Doctor of Science:—Prof. Poulton, for researches on the influence of environment upon the colours of lepidopterous larvæ and pupæ; Prof. Turner, for researches on stellar photography; Prof. Miers, for researches on the red silver ores; Prof. Love, for researches on the theory of elasticity, theoretical mechanics, and the application of mathematics to physics; Prof. Weldon, for researches on natural selection; Mr. Hatchett Jackson, for researches on comparative anatomy and the morphology of lepidoptera; Mr. Lloyd Tanner, for researches on the theory of differential equations, theory of cyclotomic functions, &c.; Mr. F. A. Bather, for researches on fossil echinodermata, pelmatozoa, and blastoidea. These gentlemen will doubtless be the first to take the new research degree, which has at present only been conferred as an honorary degree.

CAMBRIDGE.—Mr. J. G. Leatham, St. John's College, has been appointed Chairman of the Examiners for the Mathematical Tripos, Part I.

Mr. R. W. H. T. Hudson, Senior Wrangler 1898, Smith's Prizeman 1900, son of Prof. Hudson of King's College, London, has been elected to a Fellowship of St. John's College.

A meeting for the purpose of establishing a memorial of the late Prof. Sidgwick is to be held in Trinity College Lodge at 3 p.m. on November 26.

The Vice-Chancellor has published a list of donations to the Benefaction Fund, bringing up the total to over 66,000*l.* Donations to the Agricultural Education Fund, for the special purpose of equipping the experimental farm, amount to nearly 1600*l.*

It is proposed to alter the regulations for Part II. of the Natural Sciences Tripos so as to permit of a candidate being placed in the first class provided he shows a sufficiently good knowledge of two subjects combined. Hitherto a first class has been awarded only for special proficiency in one subject.

DR. ERSKINE-MURRAY was appointed, at the beginning of the present session, lecturer and demonstrator of physics and mathematics at the University College, Nottingham.

THE extent of the work of the London Technical Education Board is shown in the current number of the *Technical Education Gazette*. Particulars are given of evening classes conducted under the auspices of the Board during the session 1900-1901, and though they are closely tabulated, the tables occupy 127 pages.

DR. OSCAR LOEW, for some time expert physiologist in the division of vegetable physiology and pathology of the United States Department of Agriculture, has resigned (says *Science*) in order to accept a position in the Agricultural College of the Imperial University of Tokyo, Japan, as lecturer on physiological chemistry.

SEVERAL months ago the Senate of the University of London asked the London County Council to give the name University Avenue to the road in which the university buildings are situated, now known as Imperial Institute Road. The governing body of the Imperial Institute has, however, strongly objected to the suggested alteration, and the County Council has decided to let the old name remain.

SPEAKING at St. George's Hospital on Tuesday, Sir Michael Foster referred to the inadequate provision made in our hospitals for the scientific investigation of disease. The analysis of the phenomena presented at the bed-side and in the *post mortem*

room is not carried out as exactly, as completely, as fully, and as systematically as it might be. The use of the thermometer is a type of the exact analysis of clinical phenomena. In addition there is now chemical analysis, physical analysis, bacteriological analysis, but in none of our great hospitals is that analysis as complete, systematic, and exact as it should be. Such a complete analysis of all the phenomena in each case can only be carried on by means of thoroughly equipped laboratories in connection with the hospital—chemical, physical, biological, bacteriological, and other laboratories. In London the hospitals are less properly equipped in this direction not only than the hospitals of other countries, more especially America and Germany, but than even the hospitals of the provinces. It may or may not be desirable to attach to our hospitals chemical, physical and biological laboratories for the instruction of the student in introductory science; but each hospital ought to have its properly equipped clinical laboratories established for the welfare of the patient, the cost of which was as much a proper charge on the funds of the hospital as the bill for drugs or surgical appliances.

THE University College of North Wales has numbered, and still includes, among its professoriate the names of men of "light and leading" in the worlds of science, art and literature; hence its courses and laboratories, as described in the Calendar for the session 1900-1901, are worth examination. The physical, chemical, and biological laboratories occupy a large area, and the appliances provided are sufficient to enable the college to offer complete courses of work in their sciences. There is a department of electrical engineering maintained by means of an annual grant made by the Drapers' Company; and a course of lectures and experimental work, suitable for students of this branch of applied science, has just been commenced. Efforts are being made to establish a department of mining, and a conference in support of this object was held a few days ago at Rhyl. The conference was attended by representatives of the county councils, urban and rural district councils, and the technical instruction authorities of North Wales, as well as the owners and managers of mines, quarries, brick, steel and iron works in the northern half of the Principality. Students in the proposed department would, of course, attend the college lectures bearing upon their subject, but it would also be necessary to add to the staff a professor of mining and mine surveying, a professor of geology and mineralogy and an additional assistant lecturer in the chemical department, to take charge of the subject of metallurgy. It is estimated that, in order to meet the additional expense thus thrown upon the college, and for the proper maintenance of the new laboratories, an annual income of not less than 1100*l.* should be assured to the department. The establishment of mining and geological laboratories, and the provision necessary for the teaching of metallurgy would also render necessary a capital expenditure, including buildings, of about 8000*l.* All the speakers at the meeting, including Prof. Le Neve Foster, agreed in thinking that mining in North Wales would be benefited by the establishment of the department suggested, and resolutions were eventually adopted expressing support of the scheme, and pledging the conference to exert all possible means to carry it into effect.

THE work of the examinations department of the City and Guilds of London Institute is so extensive that the only satisfactory way to obtain an estimate of it is to read the annual report, which can be obtained for threepence from Messrs. Whittaker and Co., Paternoster-square, E.C. It appears, from the report just issued, that during the session 1899-1900 the total number of classes registered by the institute was 2460 as compared with 2087 in the previous session. The number of candidates' papers worked at the recent examinations was 15,557, as compared with 14,978 in the previous year, and whilst, only a few years ago, all the examinations were held on two days, they extended this year to twenty days. Mention has already been made of the desirability of closely associating the work of the technological department of the institute with that of the branch of the Board of Education dealing with technology. On August 24 an official announcement was made that an assistant secretary for technology had been appointed, and that "in the ensuing autumn it is proposed to appoint a departmental committee, on which the County Councils and the City and Guilds of London Institute will be represented, to consider, *inter alia*, the co-ordination of the technological administration of the Board of Education with the technological work at